

Comprehensive modernization of shunting locomotive TEM7 (No. 0145)

Today, the condition of diesel rolling stock has reached a critical level in terms of service life. In the current environment, the most realistic measure to ensure sustainable, uninterrupted and safe operation is to make fuller and more efficient use of rolling stock overhaul opportunities, i.e. modernization with the introduction of new approaches to improving the technical level of locomotives.

The comprehensive modernization of the TEM7 diesel locomotive has fully enabled the company to implement modern trends in locomotive construction.

Organizations involved in the modernization of the TEM7 diesel locomotive	
SPE UKRTRANSMASH	units БРЧЕП-4
«Nikolaev Locomotive Repair Plant» Ltd	the enterprise where the modernization was carried out
JSC “Ukrainian Energy Machines”	measuring converter ПИИТ-6, controller КМФ2001, ББК, relay and contactor equipment (train contactors, reverser, etc.)
Anglo Belgian Corporation	diesel engine 6DZC with electronic regulator HEINZMANN

The power transmission structure has not changed significantly. This made it possible to retain the ЕД-118 DC electric motors, which underwent a major overhaul.

The installation of a modern 6DZC diesel engine with a HEINZMANN electronic regulator has significantly increased fuel and oil economy and reduced emissions.

The main unit of the modernized power transmission scheme is a modern microprocessor-based unit БРЧЕП - a power transmission regulation and control unit.

The power transmission regulation and control unit (БРЧЕП-4) makes it possible to exclude old analog control units and the relay control circuit of the power transmission. The unit does not require complicated debugging of old analog units, allows implementing more advanced control and protection algorithms, and increases

the reliability of the power transmission scheme. It also implements modern slip protection, which, thanks to the dynamic regulation of the traction generator voltage, allows to realize the maximum coupling weight of the locomotive.

The power transmission regulation and control unit (БРУЭП) implements algorithms for regulating and controlling power transmission by regulating the excitation of the traction generator, controlling relay and contactor devices (train contactors, reverser, etc.), receiving feedback signals (traction motor currents, generator voltage, relay and contactor signals, etc.) from the scheme, including from the ПИИТ-6 sensor (a more modern ТИИ-1000В can be used).

The algorithm of the locomotive operation allowed to realize the Customer's requirement to have two additional modes of the locomotive operation, limiting the starting traction of the locomotive by 30% and 60% (limitation of starting currents was implemented). This made it possible to use the locomotive in the range from the maximum train weight to the weight of only one locomotive without shock starting loads.

The locomotive is controlled by a modern digital driver's controller (data is transmitted via a digital CAN channel) and additional controls from the driver's console. The signals from the controls are transmitted to the power transmission control and management unit (БРУЭП).

The introduction of a microprocessor-based control and regulating unit, diagnostic and display system made it possible to implement a project for the deep modernization of the TEM7 diesel locomotive using modern electrical equipment. The comprehensive modernization with the use of a microprocessor-based control and regulation unit allows for the application of the latest control and regulation algorithms, increases the protection of electrical equipment and simplifies the operation of the locomotive